

I Claim:

1. A frame assembly for use in construction of a building, the frame assembly adapted to support a load, the frame assembly comprising:

a pair of elongated linear structural members positioned in spaced apart relationship;

at least one elongated linear structural member extending between the spaced apart pair of elongated linear structural members,

at least one of the elongated linear structural members being formed from fiber reinforced cellular concrete, the fiber reinforced cellular concrete providing the structural strength of the at least one elongated linear structural member.

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3. A structural frame for use in forming a building, the frame comprising:  
a plurality of elongated intermediate elements having first and second ends;  
an elongated first end element fastened to the first ends of the intermediate  
elements such that each intermediate element is substantially parallel to the other

5 intermediate elements and the intermediate elements are substantially perpendicular to the  
first end element; and

an elongated second end element fastened to the plurality of intermediate elements  
at the second ends of the intermediate elements such that the second end element is  
substantially perpendicular to the intermediate elements and substantially parallel to the  
10 first end element, at least one of said intermediate or first or second end elements being  
formed from fiber-reinforced cellular concrete, the fiber reinforced cellular concrete  
primarily providing the structural strength of said at least one element.

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4. A method for making non-wood elongated rigid structural elements for use in building construction, the method comprising the steps of:

- a) mixing a cementitious material and water to produce a concrete mixture;
- b) blending a fiber into the concrete mixture;
- 5 c) blending an aerating compound into the concrete mixture;
- d) placing the concrete mixture into a form;
- e) curing the concrete mixture;
- f) removing the concrete mixture from the form; and
- 10 g) finishing the concrete mixture to form at least one elongated rigid structural element.

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5. A lumber product for use in building construction, the lumber product comprising fiber-reinforced cellular concrete made from a cementitious material, water, fiber, and an aerating material, made to form an elongated rigid element of lumber-industry-standard dimensions, wherein the cementitious material makes up approximately less than about 83% of the total weight of the lumber product, the water makes up approximately less than about 30% of the total weight of the lumber product, the fiber makes up approximately less than 4% of the total weight of the lumber product, and the aerating material makes up approximately less than 1% of the total weight of the lumber product.

6. The lumber product of claim 5, wherein the cementitious material is selected from the group consisting of: flyash and cement.

7. The lumber product of claim 5, wherein the aerating compound is selected from the group consisting of: aluminum powder and a foaming agent.

8. The lumber product of claim 5, wherein the fiber is selected from the group consisting of: carbon, polypropylene, alkali-resistant glass, and cellulose.

9. The lumber product of claim 5, wherein the cementitious material comprises cement, fly ash and silica fume or other pozzolans, and wherein the cement makes up approximately less than about 40% of the total weight of the lumber substitute product, the fly ash makes up approximately less than about 50% of the total weight of the lumber substitute product, and the silica fume or other pozzolans makes up approximately less than about 25% of the total weight of the lumber substitute product.

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at least one elongated linear structural member extending between the spaced apart pair of elongated linear structural members, at least one of the elongated linear structural members being formed from a non-laminated, substantially homogenous fiber reinforced cellular concrete.

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5 11. A lumber substitute product for use in building construction, the lumber substitute product comprising fiber-reinforced cellular concrete made from cement which makes up approximately 18-40% of the total weight of the product, fly ash which makes up approximately less than about 50% of the total weight of the product, silica fume or other pozzolans which makes up approximately less than about 25% of the total weight of the product, water which makes up approximately 20-30% of the total weight of the product, fiber which makes up approximately 0.4-3.2% of the total weight of the product, and an aerating material.

10 12. The lumber substitute of claim 11, further comprising sand which makes up approximately less than about 40% of the total weight of the product.

15 13. The lumber substitute of claim 11, further comprising a water-reducing admixture which makes up approximately less than about 0.6% of the total weight of the product.

20 14. The lumber substitute product of claim 11, further comprising a color pigment which makes up approximately less than about 3.5% of the total weight of the product.

15 15. The lumber substitute product of claim 11, wherein the aerating material is selected from the group consisting of aluminum powder and a foaming agent.

25 16. The lumber substitute product of claim 11, wherein the aerating material is an aluminum power which makes up about 0.012-0.048% of the total weight of the product.

30 17. The lumber substitute product of claim 11, wherein the fiber is selected from the group consisting of carbon, polypropylene, alkali-resistant glass, cellulose, nylon, aramid, acrylic, polyethylene, polyvinyl alcohol and polyolefin.

18. A retaining wall comprising:

a base formed from a first row of building blocks;

a wall assembly supported on the base, the wall assembly including a plurality of vertically stacked rows of building blocks, the wall assembly having a front face and a rear face;

the building blocks being formed of fiber reinforced cellular cementitious material; and

a plurality of spaced apart elongated vertically extending reinforcing strips fixed to one of the front face and the rear face of the wall assembly, the reinforcing strips each being secured to the wall assembly by a plurality of fasteners, the fasteners each extending through the reinforcing strips and into the building blocks forming the wall assembly.

19. A retaining wall as set forth in claim 18, wherein the fiber reinforced cellular cementitious material is made from cementitious material mixed with water, fiber and aerating material.

20. A retaining wall as set forth in claim 19, wherein the cementitious material makes up approximately less than about 83% of the total weight of the building blocks, the water makes up approximately less than about 30% of the total weight of the building blocks, the fiber makes up approximately less than 4% of the total weight of the building blocks, and the aerating material makes up approximately less than 1% of the total weight of the building blocks.

21. A retaining wall as set forth in claim 20, wherein the cementitious material comprises cement, fly ash and silica fume or other pozzolans, and wherein the cement makes up approximately less than about 40% of the total weight of the building blocks, the fly ash makes up approximately less than about 50% of the total weight of the building blocks, and the silica fume or other pozzolans makes up approximately less than about 25% of the total weight of the building blocks.



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22. A retaining wall as set forth in claim 18, wherein the fiber-reinforced cellular cementitious material is made from cement which makes up approximately 18-40% of the total weight of the building blocks, fly ash which makes up approximately less than about 50% of the total weight of the building blocks, silica fume or other pozzolans which makes up approximately less than about 25% of the total weight of the building blocks, fiber which makes up approximately 0.4-3.2% of the total weight of the building blocks, and an aerating material.

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